

26. An optical recording/reproducing apparatus for recording, reproducing or erasing an information signal onto/from any one of N types (where $N \geq 2$) of optical discs having first layers of different thicknesses, each type of said optical discs having at least said first layer being transparent and a second layer for storing information, by converging a light flux onto said second layer through said first layer of one of said N types of optical discs loaded in said apparatus said apparatus comprising:

a composite converging optical device comprising:

(i) a light emitting means for emitting said light flux;

(ii) a converging means for converging said light flux on said second layer of said one of said N optical discs loaded in said apparatus; and

(iii) an optical wave front correcting means disposed in an optical path connecting said light emitting means and said converging means for correcting an optical wave front of the light flux,

wherein said composite converging optical device (a) performs aberration correction in correspondence with said first layer of said loaded one of said N optical discs, and (b) converges said light flux as a smaller spot diameter D with respect to one of said optical discs having a thinner one of said substrates onto said second layer of said loaded optical disc,

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wherein said composite converging optical device differently corrects the optical wave front of the light flux in correspondence with said different thickness of said N optical discs to provide said aberration correction and said converging of said light flux, and

wherein a thickness of each of said first layers of said N types of optical discs is about 1.2mm or less.

28. An optical recording/reproducing system comprising:
(a) an optical recording/reproducing apparatus for recording, reproducing or erasing an information signal onto/from any selected one of N types (where $N \geq 2$) of optical discs having first layers of different thicknesses, each type of said optical discs having at least said light layer being transparent and a second layer for storing information, by converging a light flux on said second layer through said first layer of one of said N types of optical discs loaded in said apparatus, said apparatus comprising:

a composite converging optical device, which comprises:

- (i) a light emitting means for emitting said light flux;
- (ii) a converging means for converging said light flux on said second layer of said loaded one of said N optical discs; and
- (iii) an optical wave front correcting means disposed in an optical path connecting said light emitting means and said converging means for correcting an optical wave front of the light flux;

a photo detecting means for detecting reflective light from
said one of said N optical discs,

wherein said composite converging optical device (a)
performs aberration correction in correspondence with said first
layer of said loaded one of said N optical discs and (b) converges
said light flux as a spot with a smaller diameter D with respect
to one of said optical discs having a thinner one of said
substrates onto said second layer of said loaded optical disc,

wherein said composite converging optical device differently
corrects the optical wave front of the light flux in
correspondence with said different thickness of said N optical
discs to provide said aberration correction and said converging of
said light flux, and

wherein a thickness of each of said transparent substrates
of said N types of optical discs is about 1.2mm or less;

(b) a signal processing means, responsive to one of (i) a
reproduction signal, corresponding to said information signal,
from said photo detecting means and (ii) receipt of recording
data, corresponding to said information signal, for recording on
said disk, for generating an output signal corresponding to said
information signal for performing one of a reproducing operation
and a recording operation on said disks; and

(c) a system controlling means coupled to said signal
processing means for controlling generation of the output signal
of said signal processing means.

Please add the following new claims:

¹⁹~~29~~. An apparatus according to claim ²⁶~~26~~ wherein said composite converging optical device has different numerical apertures, and the light flux is converged as a spot with a smaller diameter D by employing a larger one of said numerical apertures.

²⁵~~30~~. An optical recording/reproducing apparatus as in claim ²⁶~~26~~, wherein each of said first layers comprises a transparent substrate.

³¹~~31~~. An optical recording/reproducing system as in claim ²⁸~~28~~, wherein each of said first layers comprises a transparent substrate.

³²~~32~~. An optical recording/reproducing system according to claim ²⁸~~28~~ wherein said composite converging optical device has different numerical apertures, and the light flux is converged as a spot with a smaller diameter D by employing a larger one of said numerical apertures.

³³~~33~~. An optical recording/reproducing system as in claim ²⁸~~28~~, wherein each of said first layers comprises a transparent substrate.

³⁴~~34~~. A system comprising:

(a) an optical recording/reproducing apparatus for recording, reproducing or erasing an information signal onto/from any selected one of N types (where $N \geq 2$) of optical discs having first layers of different thicknesses, each type of said optical discs having at least said light layer being transparent and a second layer for storing information, by converging a light flux on said second layer through said first layer of one of said N types of optical discs loaded in said apparatus, said apparatus comprising:

a composite converging optical device, which comprises:
(i) a light emitting means for emitting said light flux;
(ii) a converging means for converging said light flux on
said second layer of said loaded one of said N optical discs; and
(iii) an optical wave front correcting means disposed in an
optical path connecting said light emitting means and said
converging means for correcting an optical wave front of the light
flux;

a photo detecting means for detecting reflective light from
said one of said N optical discs,

wherein said composite converging optical device (a)
performs aberration correction in correspondence with said first
layer of said loaded one of said N optical discs and (b) converges
said light flux as a spot with a smaller diameter D with respect
to one of said optical discs having a thinner one of said
substrates onto said second layer of said loaded optical disc,

wherein said composite converging optical device differently
corrects the optical wave front of the light flux in
correspondence with said different thickness of said N optical
discs to provide said aberration correction and said converging of
said light flux, and

wherein a thickness of each of said transparent substrates
of said N types of optical discs is about 1.2mm or less;

(b) a signal processing apparatus including:
signal processing means, responsive to one of (i) a
reproduction signal, corresponding to said information signal,
from said photo detecting means and (ii) receipt of recording
data corresponding to said information signal, for recording on
said disk, for generating an output signal corresponding to said
information signal for performing one of a reproducing operation
and a recording operation on said disks; and